

PATENT
8007-1114

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Hiroki SATO et al.

Conf. 6778

Application No. 10/588,187

Group 1621

Filed August 2, 2006

Examiner T. Hain

ALKOXIDE COMPOUND, MATERIAL FOR THIN FILM FORMATION,
AND PROCESS FOR THIN FILM FORMATION

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Hiroki SATO, am one of the inventors of the above-identified U.S. patent application and hereby declare as follows.

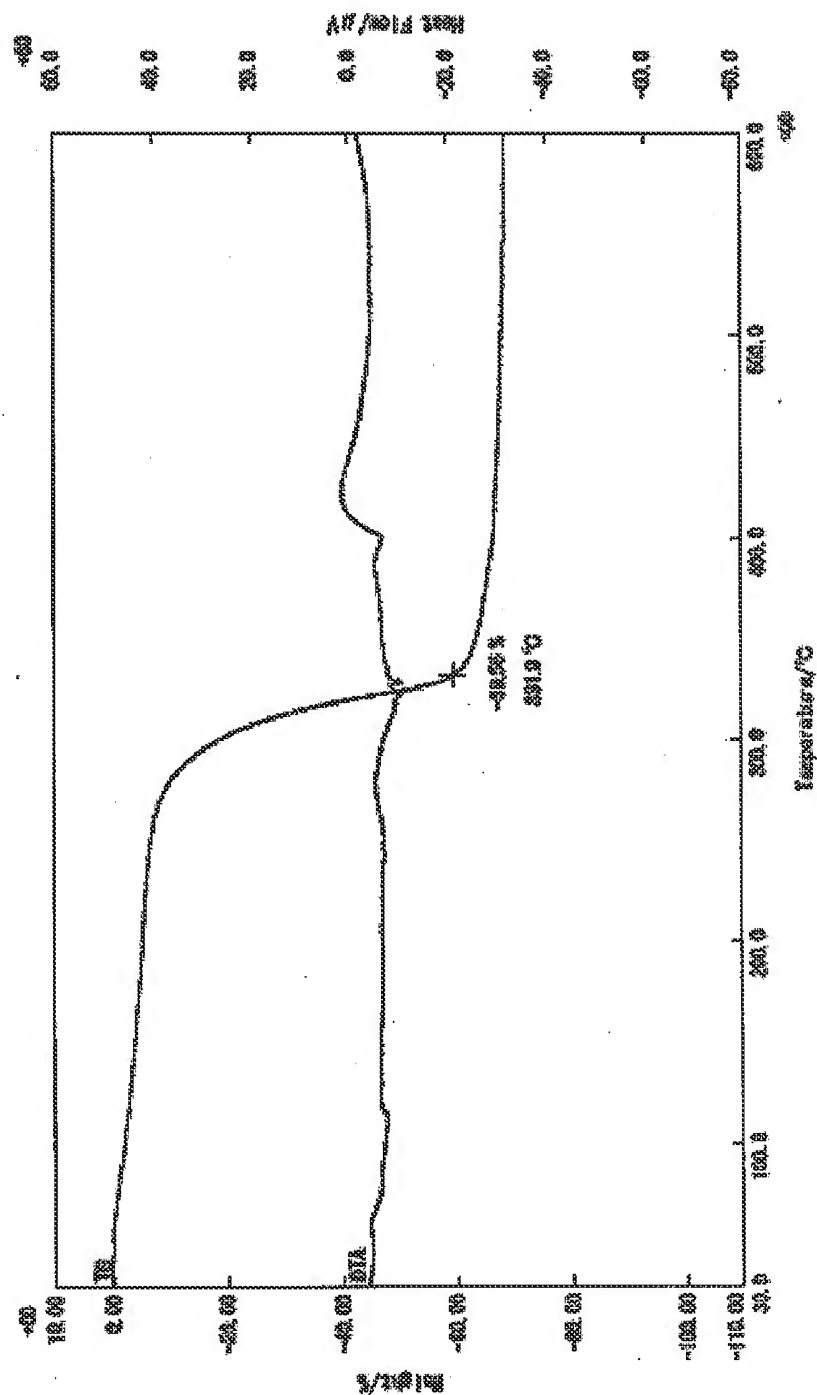
I have reviewed the non-final Office Action of October 5, 2009, and the Office Action does not appear to appreciate the difference between $\text{Hf}(\text{OCH}_2\text{CH}_2\text{N}(\text{CH}_3)_2)_4$ and $\text{Hf}(\text{OCH}(\text{CH}_3)\text{CH}_2\text{N}(\text{CH}_3)_2)_4$. Particularly, the Office Action asserts that $\text{Hf}(\text{OCH}_2\text{CH}_2\text{N}(\text{CH}_3)_2)_4$ and $\text{Hf}(\text{OCH}(\text{CH}_3)\text{CH}_2\text{N}(\text{CH}_3)_2)_4$ are homologous and expected to have a similar reactivities and physical properties.

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I make this declaration in support of the present application, and to provide evidence in rebuttal of the contention set forth in the outstanding Official Action. I supervised experiments to demonstrate the advantageous effects contributed by the branched chain contained in an alkanediyl group. The results of TG-DTA analysis are as follows:

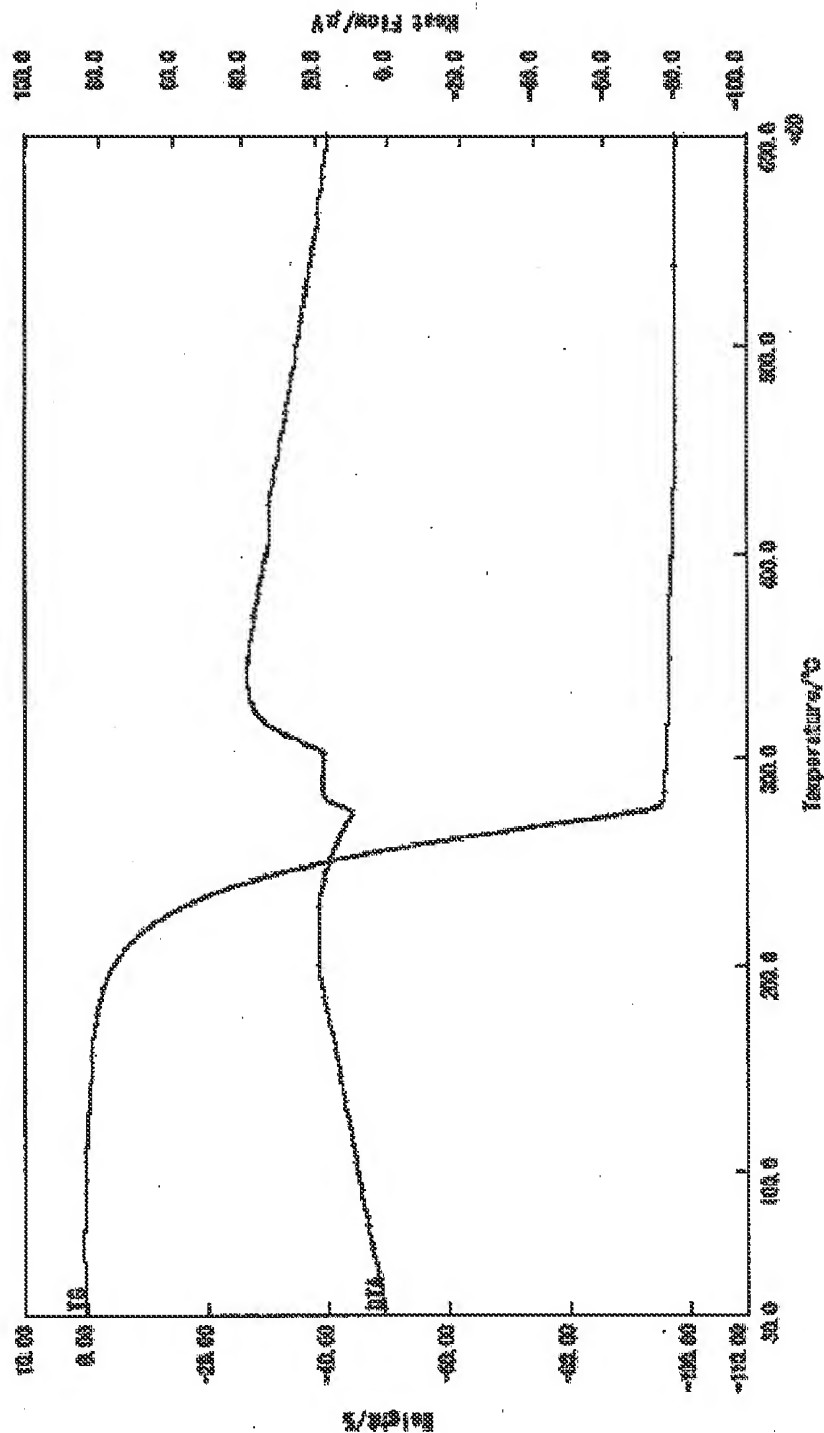
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Sample : $\text{Hf}[\text{OCH}_2\text{CH}_2\text{N}(\text{CH}_3)_2]_4$ (Comparative compound 4)
Weight : 10.06 mg
Atmosphere : Ar 100mL/min.
Rate : 10°C/min. 30°C-400°C, 50°C/min. 400°C-600°C



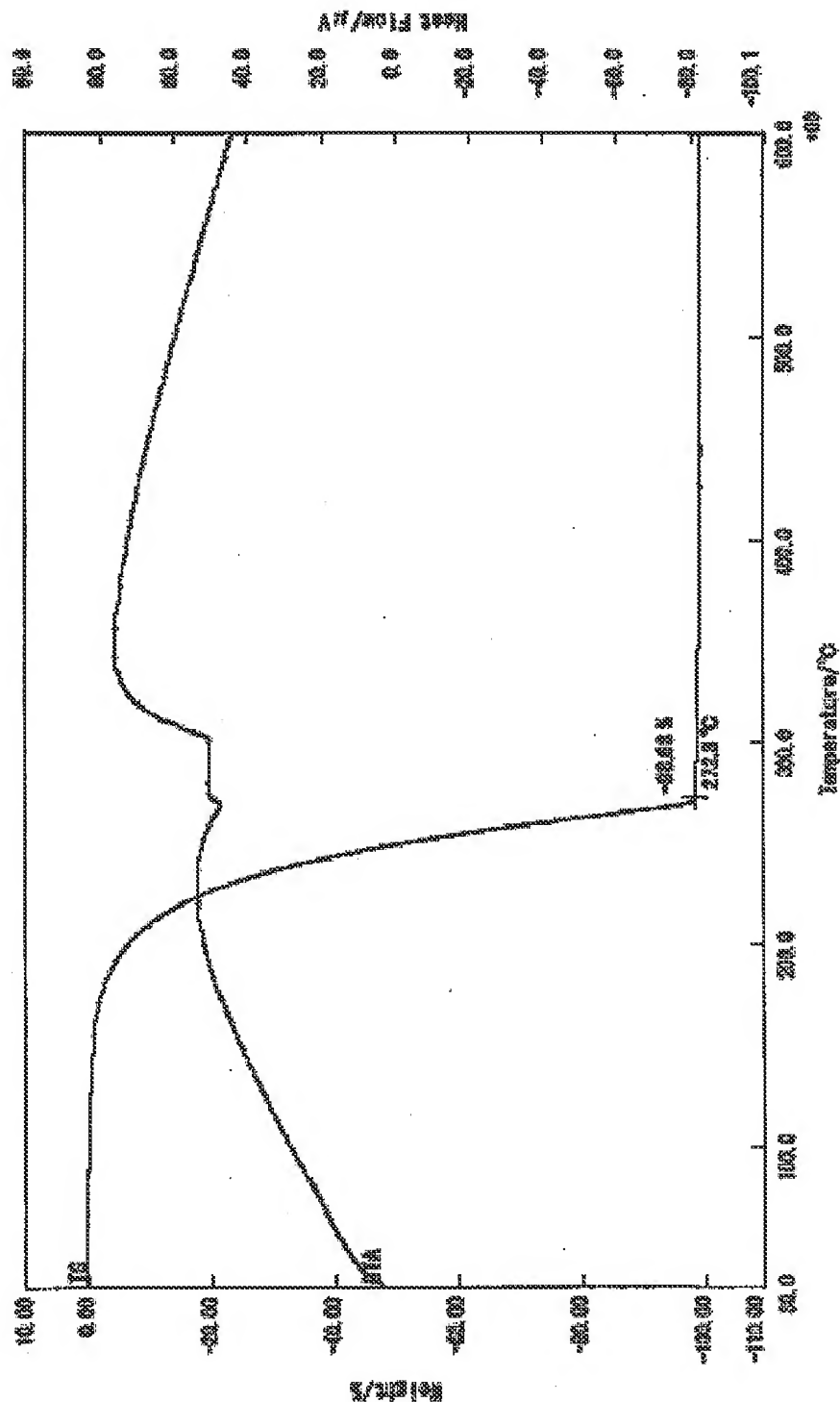
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Sample : Hf[OCH(CH₃)CH₂N(CH₃)₂]₄ (Compound No. 12)
Weight : 12.85 mg
Atmosphere : Ar 100mL/min.
Rate : 10°C/min. 30°C-300°C, 50°C/min. 300°C-600°C



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Sample : $\text{Hf}[\text{OC}(\text{CH}_3)_2\text{CH}_2\text{N}(\text{CH}_3)_2]_4$ (Compound No. 13)
Weight : 7.695 mg
Atmosphere : Ar 100mL/min.
Rate : 10°C/min. 30°C-300°C, 50°C/min. 300°C-600°C



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The above data shows that both compounds nos. 12 and 13 vaporized at around 270°C, hardly leaving residues. By contrast, even heated to 330°C or higher, almost 40% of comparative compound 4 remain as residues, so comparative compound 4 decomposed gradually only by heat, leaving residues. This suggests that comparative compound 4 as disclosed in Lim et al. is not suitable as a CVD material for thin film formation. Therefore, the claimed compound containing a branched chain alkanediyl differs from $\text{Hf}(\text{OCH}_2\text{CH}_2\text{N}(\text{CH}_3)_2)_4$ of Lim et al. in terms of reactivity and properties.

The undersigned declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Hiroki Sato

Name: Hiroki SATO

Dec. 25, 2009

Date